

REMARKS

In response to the Office Action, claims 1, 3, 9, 12-14 and 18 have been amended. New claims 19-23 have been submitted for the Examiner's consideration. Accordingly, claims 1-23 are currently pending.

Claims 1-4, 8 and 9 have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application No. 2003/0059990 to Yamazaki ("Yamazaki").

Amended claim 1 recites a method for manufacturing a semiconductor device comprising the steps of forming an amorphous semiconductor film on an insulating surface; adding a metal element for promoting crystallization to the amorphous semiconductor film; heating the amorphous semiconductor film to form a crystallized semiconductor film; irradiating a continuous wave laser beam to the crystallized semiconductor film; and removing an upper portion of the crystallized semiconductor film to which the continuous wave laser beam is irradiated.

In the present invention, "when a continuous laser beam is irradiated to a crystalline semiconductor film formed by heating with the addition of a metal element, the metal element is segregated in the vicinity of a surface of the crystalline semiconductor film," see page 6, lines 7-10. An upper portion of the crystalline semiconductor film, which is a region including the metal element and a portion of the crystallized semiconductor film, is removed. That is, the present invention discloses that the gettering site is a portion of the crystallized semiconductor film and the portion of the crystallized semiconductor film is removed to remove the gettering site. With the method of the present invention it is possible to manufacture a thin film transistor comprised of a crystalline semiconductor film more simply with fewer processes than conventionally by irradiating a continuous wave laser light to a crystalline semiconductor film. For example, see page 21, lines 14-16.

Yamazaki does not disclose or suggest "removing an upper portion of the crystallized semiconductor film to which the continuous wave laser beam is irradiated," as recited in claim 1. In contrast, Yamazaki discloses that "an amorphous silicon film ...is formed as a gettering site on the barrier film," see paragraph [0129]. That is, Yamazaki discloses that the gettering site is *over* the crystallized semiconductor film and not a *portion* of the crystallized semiconductor film. Yamazaki does not disclose or suggest using fewer processes than the conventional art by irradiating a continuous wave laser light to a crystalline semiconductor film in order to provide the gettering site in the crystalline semiconductor film. Thus, there is no motivation for Yamazaki to disclose or suggest "removing an upper portion of the

crystallized semiconductor film to which the continuous wave laser beam is irradiated,” as recited in claim 1.

Amended claim 3 recites a method for manufacturing a semiconductor device comprising the steps of forming an amorphous semiconductor film on an insulating surface; adding a metal element for promoting crystallization to the amorphous semiconductor film; heating the amorphous semiconductor film to form a crystallized semiconductor film; irradiating a continuous wave laser beam to the crystallized semiconductor film; and removing an upper portion of the crystallized semiconductor film to which the continuous wave laser beam is irradiated to reduce a concentration of the metal element in the crystallized semiconductor film to a lower detection limit of SIMS (secondary ion mass spectroscopy).

As fully set forth above, Yamazaki teaches that the amorphous silicon film is formed as a gettering site on the barrier film. Thus, Yamazaki does not disclose or suggest “removing an upper portion of the crystallized semiconductor film to which the continuous wave laser beam is irradiated to reduce a concentration of the metal element in the crystallized semiconductor film to a lower detection limit of SIMS (secondary ion mass spectroscopy),” as recited in claim 3.

The Examiner dismisses the patentable differences between the claimed invention and the gettering site of Yamazaki as being obvious because one having ordinary skill in the art could determine the claimed invention with routine experimentation. Applicant’s respectfully disagree.

No motivation exists in Yamazaki for one having ordinary skill in the art to even suggest that any routine experimentation would or should occur. It is only Applicant’s own teachings that give the Examiner cause to allege that one having ordinary skill in the art would experiment with the teachings of Yamazaki. The Examiner has failed to provide any motivation but merely states that “it would have been obvious to one of ordinary skill in the art to determine through routine experimentation.....in order to get more of the metal lowering impurities.”

Given the above, claims 1-4, 8 and 9 are allowable over the cited prior art.

Claims 5-7, and 10-20 have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application No. 2003/0059990 to Yamazaki.

Amended claim 14 recites a method for manufacturing a semiconductor device, comprising the steps of forming an amorphous semiconductor film on an insulating surface;

adding a metal element for promoting crystallization to the amorphous semiconductor film; heating the amorphous semiconductor film to form a crystallized semiconductor film; irradiating a continuous wave laser beam to the crystallized semiconductor film; and using CMP to remove an upper portion of the crystallized semiconductor film to which the continuous wave laser beam is irradiated.


The present invention discloses that it is possible to remove the metal element in the semiconductor film including an active layer as well as planarization of a surface of a thin film transistor with CMP. See page 17, lines 13-15. Yamazaki does not disclose or suggest "using CMP to remove an upper portion of the crystallized semiconductor film," as recited in claim 14.

Absent impermissible hindsight, one having ordinary skill in the art would not consider the claims of the present invention to be obviated by Yamazaki. Accordingly, Applicants respectfully submit that the rejection is not proper.

Given the above, claims 5-7 and 10-20 are allowable over the cited prior art.

In view of the foregoing, it is respectfully submitted that the claims are allowable over the cited prior art and it is requested that the rejections be reconsidered and withdrawn by the Examiner, that the pending claims be allowed and a notice of allowance issued.

Respectfully submitted,


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